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Methods of electron cooling friction force measurement suitable for NICA Booster synchrotron

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Electron cooling is a method of reducing momentum spread of ion beams in synchrotrons. The mechanism of electron cooling is based on temperature exchange between circulating ions and a cold electron beam coming from an electron gun and then accelerated to the same velocity as ions. For small ion density the equilibrium temperature of the ion beam is set by effective temperature of electrons. With an increase of ion density their equilibrium temperature may be limited by intrabeam scattering in the ion beam. In the range of very small velocities the plasma perturbation frequency is not working and experimental measurements are required to understand the electron cooling in the region of small velocities. The precision of cooling force measurement depends on a chosen method and accuracy of available beam instrumentation. In this paper, the measurement methods for electron cooling force are reviewed, and the potential of their usage at Booster synchrotron of NICA accelerator complex are discussed.

Summary

Presenter: ЧУМАКОВ, Даниил (ОИЯИ / НИ ТПУ)

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